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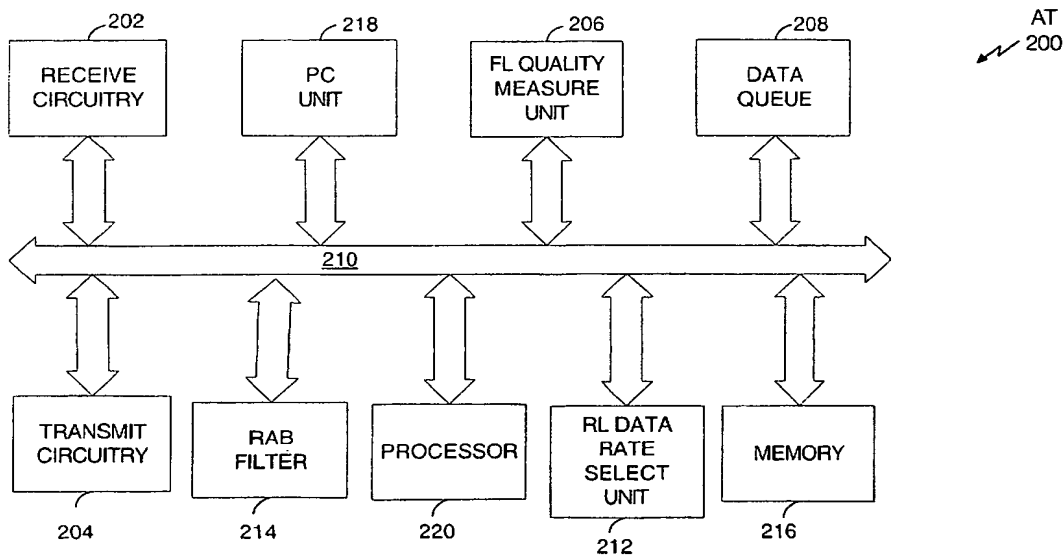
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[Continued on next page]

(54) Title: WIRELESS COMMUNICATION RATE SHAPING



(57) Abstract: Reverse Link (RL) data rate allocation in a High Data Rate (such as 1xEV-DO) system as a function of Forward Link (FL) channel quality. Rate shaping of a throughput profile for multiple Access Terminals (ATs) is performed by adjusting transition probabilities associated with a data rate allocation algorithm. The RL maximum data rate per AT is adjusted to reduce the loading in a designated area and result in rate shaping of the cell and/or sector. In one embodiment, the maximum data rates are adjusted as a function of the FL Signal to Interference and Noise Ratio (SINR), such as measured per serving sector or as a captured sum total of FL SINR. In still another embodiment, the maximum data rates are adjusted as a function of differences in riseover-thermal values between neighboring sectors.



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

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## INTERNATIONAL SEARCH REPORT

Int. Application No

PCT/US 03/36085

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04Q7/38

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04Q H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99/23844 A (QUALCOMM INC) 14 May 1999 (1999-05-14)	1,2,4,5, 8,11,19, 20
Y	page 5, line 32 - page 6, line 6 page 36, line 34 - page 37, line 32 page 40, line 32 - page 41, line 21 page 44, line 12 - page 45, line 11 page 46, line 15 - page 47, line 9 figure 28 table 5  ----- -/--	3



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
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- \*P\* document published prior to the international filing date but later than the priority date claimed

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- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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- \*G\* document member of the same patent family

Date of the actual completion of the international search

20 July 2004

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16.08.04

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## INTERNATIONAL SEARCH REPORT

Int. Application No.

PCT/US 03/36085

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	US 5 442 625 A (GITLIN RICHARD DENNIS ET AL) 15 August 1995 (1995-08-15) column 1, line 7 - line 10  column 1, line 45 - line 59 column 6, line 48 - line 66 column 7, line 33 - line 37 figures 1,5	3  1-21, 33-36
X	----- EP 1 231 807 A (LG ELECTRONICS INC) 14 August 2002 (2002-08-14) page 4, line 31 - line 36 page 5, line 3 - page 6, line 7 page 6, line 49 - line 54 page 7, line 20 - line 39 page 7, line 55 - page 8, line 7 figures 2,3,5,6,8	6,13
X Y	----- US 2002/015388 A1 (CHOI HO-KYU ET AL) 7 February 2002 (2002-02-07) page 1, paragraph 3  page 1, paragraph 10 - paragraph 11 page 3, paragraph 29 - paragraph 33 page 5, paragraph 65 - page 6, paragraph 79 figure 6	6,13  7,16,21
Y	----- EP 1 077 580 A (LUCENT TECHNOLOGIES INC) 21 February 2001 (2001-02-21) page 3, paragraph 7 page 5, paragraph 18 - page 6, paragraph 25 figures 1-3	7,16,21
A	----- WO 00/38348 A (NOKIA NETWORKS OY ;LAAKSO JANNE (FI)) 29 June 2000 (2000-06-29) page 6, line 16 - page 7, line 30 page 19, line 14 - line 25 page 22, line 16 - page 23, line 16 page 25, line 9 - page 28, line 17 page 29, line 9 - line 21 page 31, line 5 - line 25 page 41, line 1 - line 24 page 43, line 13 - page 44, line 30 page 48, line 8 - line 16 figures 1,3A-3C	7,16,21
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## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 03/36085

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2002/159395 A1 (HOFFMANN JOHN E ET AL) 31 October 2002 (2002-10-31) page 1, paragraph 6 - paragraph 9 page 3, paragraph 29 page 4, paragraph 49 page 5, paragraph 74 - page 6, paragraph 76 page 9, paragraph 124 - paragraph 129 figures 1,8	1-21, 33-36
A	WO 00/14900 A (QUALCOMM INC) 16 March 2000 (2000-03-16) page 1, line 7 - line 9 page 16, line 30 - page 19, line 30 figures 1,2,6	1-21, 33-36
X	WO 01/24004 A (QUALCOMM INC) 5 April 2001 (2001-04-05)	22,23, 26,27, 30-32, 33-36
A	page 1, line 6 - line 8 page 5, line 10 - page 6, line 6 page 7, line 7 - page 8, line 16 page 7, line 22 - page 10, line 8 page 10, line 23 - page 11, line 22 figures 2,4,5	
A	WO 01/03357 A (QUALCOMM INC) 11 January 2001 (2001-01-11) page 9, line 9 - page 10, line 30 page 14, line 16 - page 15, line 8 figures 1,3	22-32
A	WO 01/24568 A (QUALCOMM INC) 5 April 2001 (2001-04-05) page 1, line 7 - line 10 page 5, line 3 - line 25 page 12, line 22 - page 13, line 31 figures 1F,2	22-32

# INTERNATIONAL SEARCH REPORT

national application No.  
PCT/US 03/36085

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-21, 33-36

The first invention relates to methods and corresponding apparatus for determining the channel quality measuring different parameters, determining a maximum reverse link data rate depending on the channel quality. This relates to the problem of how to improve the performance of a wireless communication system.

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2. claims: 22-32

This invention concerns, as no advantageous effects could be seen with the prior art disclosed in document D1 methods and corresponding apparatus for providing an alternative solution to determine whether a reverse link rate should be increased or decreased. This problem is solved by transition probabilities corresponding to a plurality of data rates, wherein said transition probabilities are adjusted and applied to determine the change of a reverse link data rate.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 03/36085

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9923844	A	14-05-1999	US 2003063583 A1	03-04-2003
			AU 750154 B2	11-07-2002
			AU 1303299 A	24-05-1999
			BR 9813885 A	26-09-2000
			CA 2306868 A1	14-05-1999
			CN 1381997 A	27-11-2002
			CN 1124754 B	15-10-2003
			EP 1326471 A2	09-07-2003
			EP 1434448 A2	30-06-2004
			EP 1029419 A2	23-08-2000
			HU 0100629 A2	28-06-2001
			ID 28082 A	03-05-2001
			JP 2001522211 T	13-11-2001
			NO 20002228 A	03-07-2000
			NZ 503841 A	25-10-2002
			NZ 519543 A	27-02-2004
			NZ 520681 A	27-02-2004
			PL 342656 A1	02-07-2001
			TR 200001200 T2	21-11-2000
			WO 9923844 A2	14-05-1999
			US 2003142656 A1	31-07-2003
			ZA 9810003 A	02-08-2000
US 5442625	A	15-08-1995	CA 2145708 A1	14-11-1995
			EP 0682423 A2	15-11-1995
			JP 8065273 A	08-03-1996
			US 5856971 A	05-01-1999
EP 1231807	A	14-08-2002	KR 2002066590 A	21-08-2002
			KR 2003005899 A	23-01-2003
			KR 2003024442 A	26-03-2003
			CN 1371219 A	25-09-2002
			EP 1231807 A2	14-08-2002
			US 2002141349 A1	03-10-2002
US 2002015388	A1	07-02-2002	KR 2002006588 A	23-01-2002
EP 1077580	A	21-02-2001	US 6456850 B1	24-09-2002
			AU 5196900 A	22-02-2001
			BR 0004560 A	03-04-2001
			CA 2315847 A1	17-02-2001
			CN 1284823 A	21-02-2001
			EP 1077580 A1	21-02-2001
			JP 2001119355 A	27-04-2001
WO 0038348	A	29-06-2000	WO 0038348 A1	29-06-2000
			AU 2415199 A	12-07-2000
			BR 9816103 A	04-09-2001
			CN 1124700 B	15-10-2003
			EP 1142154 A1	10-10-2001
			JP 2002533984 T	08-10-2002
			US 2003003921 A1	02-01-2003
US 2002159395	A1	31-10-2002	NONE	
WO 0014900	A	16-03-2000	US 6597705 B1	22-07-2003
			AU 6036799 A	27-03-2000
			CN 1141802 C	10-03-2004



# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 03/36085

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0014900	A		EP 1112624 A1	04-07-2001
			JP 2002524962 T	06-08-2002
			WO 0014900 A1	16-03-2000
			US 2003193907 A1	16-10-2003
WO 0124004	A	05-04-2001	US 6665272 B1	16-12-2003
			AU 7623400 A	30-04-2001
			BR 0014296 A	27-08-2002
			CA 2384472 A1	05-04-2001
			CN 1377484 T	30-10-2002
			EP 1222538 A2	17-07-2002
			JP 2003510928 T	18-03-2003
			NO 20021505 A	29-05-2002
			TW 539999 B	01-07-2003
			WO 0124004 A2	05-04-2001
WO 0103357	A	11-01-2001	US 6556549 B1	29-04-2003
			AU 5911500 A	22-01-2001
			BR 0011966 A	17-12-2002
			CA 2377060 A1	11-01-2001
			EP 1192749 A1	03-04-2002
			JP 2003521847 T	15-07-2003
			NO 20016409 A	24-01-2002
			WO 0103357 A1	11-01-2001
			US 2003072287 A1	17-04-2003
			US 2003076795 A1	24-04-2003
			US 2003112774 A1	19-06-2003
WO 0124568	A	05-04-2001	US 6563810 B1	13-05-2003
			AU 7623300 A	30-04-2001
			BR 0014397 A	20-08-2002
			CN 1377562 T	30-10-2002
			EP 1216595 A1	26-06-2002
			JP 2003510991 T	18-03-2003
			TW 484334 B	21-04-2002
			WO 0124568 A1	05-04-2001
			US 2003133409 A1	17-07-2003

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